Gender differences in emergency department pain management: Results from a multi-site study

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Abstract

Pain is one of the most frequent primary complaints that bring patients into the Emergency Department (ED) – and pain treatment is known to be ineffective for half of these people (Galinski et al., 2010). For this reason, timely and effective pain management is essential. Previous research on gender differences in pain treatment has produced mixed results, and few data from ED settings are available. Thus, the purpose of this study was to examine gender differences in the timeliness, type/amount of opioid pain medication, or pre- and post-pain scores following medication administration between male and female patients in two large EDs. Retrospective patient visit data on chief complaint, pre- and post-medication pain score, and timeliness of medication administration from N = 1,966 patients were combined with three months' worth of prospectively collected hourly ED departmental conditions data. ED conditions included unit census, and staffing and acuity levels, among other variables. The analysis revealed no statistically significant gender differences in the timeliness of treatment, choice of opioid pain medication, or number of doses. These results present an encouraging picture where male and female patients received equally timely and consistent pain treatment.

Chapter I: Statement of the Problem

Introduction

Previous studies have reported gender differences in pain treatment in emergency settings (Chen et al., 2008; Weimer et al., 2013). Some have suggested that women and men experience and report pain differently. This study aimed to discover if gender is associated with differential pain reporting by women and men for a variety of conditions, and if there are gender differences in pain treatment. Though the more modern conception of gender as *gender identity* is well understood by the writer, in this paper the term gender is used to describe the reported biological sex of the subjects in the study, consistent with previous research and reporting in the biomedical literature.

Background of the Problem

Pain is the most frequent primary complaint that brings patients into the Emergency Department (ED) (Galinski et al., 2010; Raftery, Smith-Coggins, & Chen, 1995). For this reason, the team of physicians, physician assistants, nurse practitioners, and nurses need to have a better definition of "the standard of care for pain management" (Raftery et al., 1995). The focus of this study is to determine if there are any differences in the timeliness, type/amount of opioid pain medication, or pre- and post-pain scores following medication administration between male and female patients.

Studies show that the pain management in emergency medicine is often ineffective and that only one in two patients experience any kind of pain relief with medication (Galinski et al., 2010). Because pain is a subjective experience and cannot be objectively graded by the provider, it is imperative that clinical personnel have distinct information on what pain treatment

works and what does not. This study will further explore the effectiveness of pain management with opioids by assessing pain scores reported by patients before and after med-administration.

Women seem to experience more pain than men, and perhaps experience it differently. Women are more commonly diagnosed with two or more pain conditions and have more pain-related diagnoses. (Weimer et al., 2013, p.1839) However, studies have shown that they are less likely than men to receive any analgesia and even less to receive opiates (Chen et al., 2008,). Raftery et al. (1995) examined how the provider's perception of the pain a patient was experiencing was a direct correlation to the pain management that the patient received. Raftery found that providers perceived females as experiencing more pain and, thus, were more likely to receive treatment and more potent analgesics than men. This perception is supported by a study led by Musey et al. (2014, p.1422) who noted women are more sensitive to pain and have reduced pain inhibition compared to men. The discrepancy between these studies indicates a need to determine how to best meet the needs of pain for each gender.

The time between being admitted to the emergency department and when that patient receives analgesia is crucial to patients and is impacted heavily by staffing. Chen et al. (2005) found that women had to wait an average of sixteen minutes longer than men to receive analgesia. This study explores if gender differences in timeliness of pain treatment and other comparisons still exist in two large EDs in different geographic regions of Ohio.

Purpose of the Study

The purpose of this study is to examine the timeliness, type/amount of opioid pain medication, and pre- and post-pain scores following medication administration between male and female patients in two large, geographically separated EDs in Ohio. This study was part of a

larger overall study examining timeliness in opioid pain medication administration and its relationship to nurse staffing and other ED conditions.

Significance of the Study

The study of pain management will allow for better insight on whether or not males or females receive equivalent pain-related care in two Ohio EDs. All hospitals seek to provide care to that is equivalent across all demographic factors, and as such, it is important to periodically assess this since previous studies have shown inconsistent findings (Gardner, Almeida, Maselli, & Auerbach, 2010; Weimer et al., 2013).

Conceptual Frame of Reference (Theory)

The concept of this study is based on the inconclusive results of previous pain management studies in relation to gender. Some studies show females receiving better pain management (Raftery et al., 1995; Weimer et al., 2013), others show males receiving better care (Chen et al., 2008), and there were also some that indicated no variances (Banz et al., 2012). The discrepancies described, and the fact that pain in poorly managed for almost half of patients presenting with pain (Galinski et al., 2010), helped to generate need for this study.

Research Questions

Three questions guided this study:

1. Are there differences in timeliness of pain medication administration between male and female patients?
2. Are there differences in the type and number of doses of pain medication between male and female patients?
3. Are there differences in the pre-medication administration and post-medication administration pain scores between male and female patients?

Definition of Terms

There are a variety of terms throughout the paper which are important to note and define. An *opioid* is defined as "any of a group of endogenous neural polypeptides (as an endorphin or encephalin) that bind especially to opiate receptors and mimic some of the pharmacological properties of opiates" by Merriam-Webster. *Opioids* can also be described as synthetic drugs possessing narcotic properties similar to opiates but not derived from opium. Opioids are an example of what would be considered analgesics. An *analgesic* is a drug that relieves pain (produces analgesia) (Merriam-Webster).

Merriam-Webster defines *triage* as the process of deciding which patients should be treated first based on how sick or seriously injured they are. This correlates with the Emergency Severity Index. "The Emergency Severity Index (ESI) is a five-level emergency department (ED) triage algorithm that provides clinically relevant stratification of patients into five groups from 1 (most urgent) to 5 (least urgent) on the basis of acuity and resource needs." (Gilboy, Tanabe, Travers, & Rosenau, 2011)

It is also important to define the variables in Table 2. *Door-to-Med Minutes* refers to the number of minutes that passed from the time the patient arrived to the ED to the time they received his/her first opioid medication. In this study, the time intervals were calculated based on times captured in electronic medical record systems. *Pain score before* refers to the numerical pain score (1-10) the patient assigned to his/her pain before receiving their initial opioid medication dose. *Pain score after* refers to the numerical pain score (1-10) the patient assigned to his/her pain 30-60 minutes following his/her initial opioid medication dose. *Total number doses given* refers to the number of doses of opioid pain medications the patient received during their time in the ED.

Limitations

A major limitation of studying pain is that there is not an objective way of assessing pain levels. Healthcare professionals have to rely on patients self-reporting their pain which is not very reliable because every person experiences pain differently (Musey et al., 2014). As a retrospective study, patient-level data were not being actively collected for research. Instead, patient data were entered in hospital charting systems for the purpose of patient care which can limit the data integrity. Due to missing data on some patient charts, not every patient contributed to the analyses in support of each research question. When collecting data for the study, the number of opioid doses was accounted for but not the milligrams administered. This was another limitation because males and females are given different amounts of opioids at a time and having this information would have opened the door to deeper analysis. Lastly, the charts that were used for this study represent only those patients who came to the ED *and* received an opioid pain medication during their visit. If a female had presented to the emergency department with a chief complaint of pain but did not receive an opioid analgesic, this would not be known with the current study design.

Chapter II: Review of the Literature

Pain is a poorly understood concept when it comes to medical treatment. It is the most common reason for people to seek medical attention yet is undertreated in Emergency Departments (Raftery et al., 1995, p. 415). A study regarding prehospital emergency medicine determined that only 51% of its participants experienced pain relief; a similar level of pain relief to that of the patients that did not receive any treatment (Galinski et al., 2010, p. 337). Several studies have looked into gender differences in pain management and the results have been inconclusive.

Women are more commonly diagnosed with two or more pain diagnoses than men but are less likely to receive chronic opioid treatment (COT) (Weimer et al., 2013, p. 1839). With women going to emergency departments more frequently than males with pain complaints, it could be inferred that women might not be receiving adequate treatment (Weimer et al., 2013, p. 1845). This is backed up by a study showing that women and men had similar pain scores but females were 13-25% less likely than males to receive any analgesia and even less likely to get opiates (Chen et al., 2008, p. 416). Additionally, women also had to wait longer to receive analgesia at an average of 15-16 minutes longer than men (Chen et al., 2008, p. 417).

Provider perception plays a role when it comes to pain management. Women are perceived to experience more pain by their healthcare providers but one study showed that this played no effect on the treatment the women received compared to that of men. Instead, it proved that the patient's perception of his/her own pain was the driving force of what kind of treatment they would receive, not the perception of the provider. In this particular study, Gender Associated Differences in Emergency Department Pain Management, females received more pain medications and more potent analgesics than males (Raftery et al., 1995, p. 414).

Lastly, studies showed that the discrepancies in pain management between males and females were more apparent in patients less than 50 years old. Once a patient reached 50, the differences in pain management still existed but were much less (Chen et al., 2008, p. 415). Similar results were found in a VA pain management study which showed that the gender "difference in pain management was significant in all age groups but became less pronounced in older veterans" (Weimer et al., 2013). In summary, the literature reveals inconclusive evidence of gender bias in pain management in emergency department settings. This information led to the formulation of this project to better determine the presence of gender bias.

Chapter III: Methodology

Research Design

This study answers sub-questions of a larger, combined retrospective/prospective study. The retrospective component consists of data collected from the medical records of patients with chief complaints of pain from two large Emergency Departments. One was a large, urban ED (>90,000 visits/year) in a Midwestern city and the other was a moderate sized, but busy (>60,000 visits/year), ED in a small, rural Appalachian town. These data were combined with prospective data on ED conditions collected hourly over a 3 month period in 2013. Patient-level data from the retrospective collection including chief complaint, ESI score, number of previous visits to the ED in the past 12 months, opioid administered, pre- and post-medication pain scores and other variables were coded and entered into a spreadsheet by trained research staff and then analyzed using SPSS v 22.

Population and Sample Design

All adult patients (≥ 18 years of age) who received one of four opioid pain medications: hydromorphone, morphine, hydrocodone/acetaminophen, or oxycodone (either separately or in combination with acetaminophen) between May-July 2013 were eligible for the study. After obtaining human subjects' approval from both study sites, the pharmacy departments of the two hospitals generated an administrative dataset containing all patients meeting the above criteria. Due to the large volume of patients meeting criteria, a random sample of $N = 1200$ patients from each site was selected for inclusion in the study. Patient-level data were abstracted from the charts of patients who received an opioid medication during their length of stay in the ED in one of the two participating emergency departments. After excluding patients with missing *ED*

conditions data, the final sample size was N = 1,966 patients from across two sites, greatly exceeding requirements.

Data Collection Procedures

The larger study consisted of two phases of data collection. Prospectively, data were collected from two Ohio emergency departments for three months during the summer of 2013. Data were recorded each hour on variables reflecting ED conditions. Variables included the number of nurses providing direct patient care, the number of direct-care non-nurses, total ED census, number of patients in the waiting room, number of Emergency Severity Index Level 1, 2, and 3 patients in the department, etc. For this study, the prospective data were not necessary and it was the retrospective aspect that was used.

The retrospective phase of data collection consisted of collecting patient-level data from medical records of patients seen in the ED during the time period of the prospective data collection. Patient charts were selected at random from those patients seen during the prospective study time period who received one of four opioid pain medications. Trained research assistants (who were also nursing students) collected patient-level data from electronic medical record sources. These data included age, gender, chief complaint at presentation, number of ED visits to same ED in past 12 months, ESI acuity level, time of arrival, time seen by an independent provider (from presentation to being seen by a physician/NP/PA), time of opioid medication order, time of administration of the first dose of the opioid, number of opioid doses given, pain score before initial dosing, pain score after initial dosing, and discharge disposition (admitted, transferred, discharged).

Ten percent of the study records were audited for accuracy by the PI or other member of the study team. Prospective and retrospective data were then matched according to the time of

visit. In this way, the ED conditions during the time of the patient visit were linked to an individual patient, allowing for analysis of combined patient-level and departmental conditions most likely to influence the care provided to the patient. Data were analyzed using SPSS v. 22.

Chapter IV: Results

Chapter V: Conclusions and Recommendations

Summary of Findings

Data from N = 1,966 subjects were available for analysis. The sample consisted of 46.6% males who were on average, 46 years old and 53.4% female who were on average 47 years old. Patients most frequently presented with abdominal pain (24.6%), followed by chest pain (9.8%), back pain (8.6%), and leg pain (5.9%). There was a total of 20 different pain descriptor categories. A significant majority of participants had an Emergency Severity Index score of 3 (77.1%). Only 12 (<0.01%) patients had an ESI score of 1.

Independent samples *t* tests were used to examine differences between male and female subjects on four key measures: door-to-med minutes, total opioid doses given, pain score before, and pain score after medication administration. The average time from arrival/triage in the ED to the first administration of opioid pain medication was 99.5 minutes for males and 99.4 minutes for females (t = .028, df = 1964, p = .977). Male and female patients received an average of 1.6 opioid doses during their length of stay in the ED (t = .052, df = 1964, p = .959). No statistically significant differences in pain scores before (-1.11, df = 1888, p = .266) or after (-1.30, df = 1217, p = .192) pain medication administration were noted. Table 1 visually displays these comparisons and illustrates that there were no statistically significant - nor clinically meaningful - gender differences in timeliness of pain medication administration, number of doses of opioid medication administered, or pre- and post-medication pain scores were found.

Table 1

Results of the four group-wise comparisons

Variable		*n*	*M* (SD)	*p* value
Door-to-Med Minutes	male	916	99.5 (68.4)	.98
	female	1050	99.4 (74.3)	
Pain score before	male	867	7.6 (2.6)	.96
	female	1023	7.8 (2.6)	
Pain score after	male	572	4.9 (3.0)	.27
	female	647	5.15 (3.0)	
Total opioid doses given	male	916	1.6 (.84)	.19
	female	1050	1.6 (.89)	

Conclusions

The management of pain for both males and females proved to be very similar across all four comparisons and there no tests produced statistically significant results. Clinically, the very small numerical differences on some measures show some baseline differences between males and females but no differences in staff treatment of patients based on gender. This is encouraging since previous studies have shown gender disparities in pain management (Chen et al., 2008; Weimer et al., 2013). Overall, ED patients waited approximately 99 minutes from the time they arrive in the ED to the time they receive their first pain medication, which is of concern – but when reviewing data available from hospitalcompare.gov – these wait times are very common in EDs in the United States. Also, the patients' relief of pain after initial opioid dosing was not substantial; pain scores dropped at an average of 2.7 points on a 10 point pain scale. These results indicate that pain management could be improved.

Implications of this Study

This study provides encouraging evidence that male and female patients receiving pain medication in one of two busy EDs are treated similarly on several measures. Across several

important variables, including the timeliness of pain medication administration and number of doses administered, no statistically significant differences were noted. Female patients reported less overall improvement in pain after medication administration, consistent with previous research.

Recommendations

The indication that ED pain management strategies, especially ones based on opioid medication, do not produce as profound of improvements as most clinicians might predict suggests the need for better methods of assessing and treating acute pain. Some patients may benefit more fully from current strategies while other subgroups may be best treated using other methods – but more research to identify these strategies is needed. Using a standardized triage classification system may help clinicians treat pain more equitably and successfully. Despite being a universal human experience, pain is not very well understood and additional research is needed to give deeper insight on how to best assess, treat, and manage pain in a variety of patients.

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